

29 Weathering, Erosion, and Deposition



Earth processes are dynamic actions that occur both on the earth's surface and inside the earth. Any process that breaks down earth material, such as water eroding the side of a hill, is called a **destructive** process. Processes that build up earth material, such as the deposition of sediments that create landforms such as deltas, are called **constructive** processes.

Destructive forces are not always harmful and constructive forces are not always helpful. The effect of natural earth processes depends on the situation. Before building, it helps to understand how certain earth processes affect the land you plan to build on.

CHALLENGE

What happens when soil and rocks are moved from one place to another?



Destructive earth processes helped form these towers of rock, called hoodoos, in Arches National Park.



In Alaska, where this river meets a lake, constructive earth forces built up a delta.

MATERIALS



For each student

- 1 Student Sheet 29.1, “Three-Level Reading Guide: Weathering, Erosion, and Deposition”

READING

Use Student Sheet 29.1, “Three-Level Reading Guide: Weathering, Erosion, and Deposition,” to guide you as you complete the following reading.

The Process of Weathering

One earth process that breaks down rocks into smaller pieces is called **weathering**. Over time, rocks crack, crumble, and are broken apart by water and wind. Drops of water on a rock may repeatedly freeze and melt, causing the rock to crack. Water may react with some of the chemicals in a rock and cause part of the rock to break down. Rocks sometimes fall from higher places, breaking as they fall. Small animals and the roots of plants also contribute to the weathering of rock when they burrow into the ground. Weathering forms sediments that can be moved by wind and water.



The Process of Erosion

The movement of sediments from one place to another by water, wind, or ice is called **erosion** (e-ROW-shun). When water erodes the earth's surface, it cuts into the ground, forming surface channels. These channels can range from tiny depressions in the earth to huge canyons, such as the Grand Canyon. Slow and steady water erosion over long periods of time has created valuable features of the earth's landscape such as lakes, rivers, hills, canyons, and fertile plains.

Erosion can form important landforms, but it can also be damaging. Serious problems can occur when land quickly collapses or slides near buildings or roads, as shown below. Slower erosion can also cause damage to roads and buildings. A hillside that erodes over many years can cause buildings on it to shift or be in danger of toppling over. Erosion near a road can cause rocks and sediments to suddenly move onto the road. Even worse, the road itself could eventually erode.



This house was destroyed when the land under it collapsed.

The Process of Deposition

When erosion carries sediments from one place to another, the sediments are left, or *deposited* somewhere else. This earth process is called **deposition** (de-puh-ZI-shun). It occurs when pieces of rock or soil settle out of flowing water or wind as they slow down. The processes of erosion and deposition are closely related because erosion moves the sediments that are eventually deposited. A delta at the mouth of a river is an example of a landform formed by deposition.

In some cases, deposited sediments can be helpful. For example, sediments add important nutrients to the soil. The Mississippi and Nile River valleys have large fertile **floodplains** that are excellent for growing crops. These plains have been formed by the deposition of sediments that occurs when the rivers flood. After very long periods of time, deposited sediments can even form rocks such as sandstone. Deposition also builds landforms in new places. Figure 1 below shows the amount of sediment at the mouths of rivers in different areas of the U.S. Notice the large amount of sediment where the Mississippi River empties into the Gulf of Mexico.

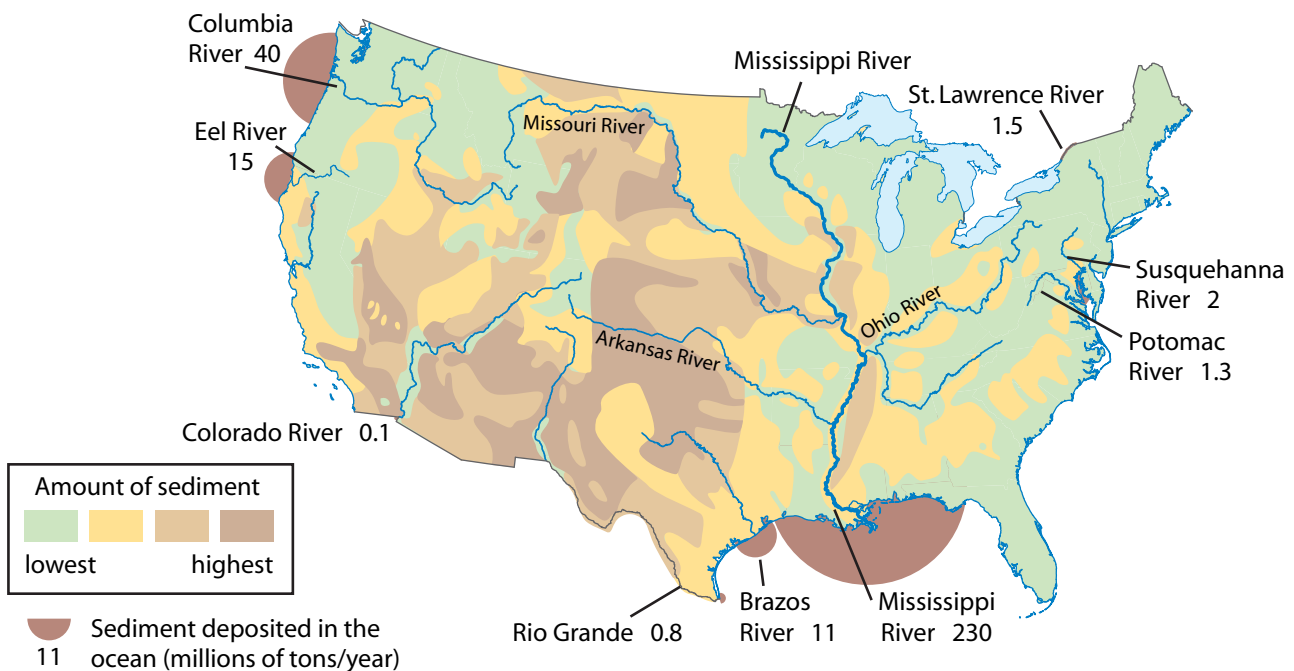


Figure 1: Sediment Deposition in the United States

The size of each brown semicircle indicates the amount of sediment deposited by a river when it empties into the ocean. Darker colors on the land indicate eroded sediments that will be moved by rivers.



Sediments have filled up the opening of this drainage pipe that empties a stream into a lake.

In other cases, deposited sediments can be harmful. Sediments can build up and fill in rivers, lakes, wetlands, bays, and even parts of the ocean. Sediments can cover the habitat areas needed by fish and other animals. For people, deposition in the wrong place can make the water too shallow for boats and clog the pipes that provide water to towns and cities.

People and Earth Processes

The processes of weathering, erosion, and deposition have been occurring for billions of years. Many natural factors affect the rate of these processes. In addition, human activities can accelerate them. For example, the photos below show that clearing plants from the land can result in erosion or deposition. Construction and farming are the two human activities that cause the most erosion. These activities break apart the rocks, soil, and plant roots that hold the land in place. This makes it easier for water or wind to erode the exposed land. In time, the effects of such erosion can make such areas less suitable for building or farming.



In this suburban neighborhood, sediments were washed into the street by the rain, because the soil was not protected during house construction.



On this farm, rains have damaged crops by eroding soil from one place and depositing it in another location.

Once sediments have been eroded as a result of human actions, they can cause problems when they are deposited. Many rivers, lakes, and ocean areas have been filled in by heavy deposition. In addition, sediments can carry pollution when they are deposited. These sediments can carry toxic materials, such as pesticides used in farming or chemicals that are already present in the soil.

ANALYSIS

1. Why is weathering important to the process of erosion?
2. Why does erosion always lead to deposition? Explain and provide an example.
3. Prepare a concept map for weathering, erosion and deposition. Be sure to use the following terms:



earth processes	weathering	erosion
deposition	sediments	wind
water	ice	floodplains
lakes	toxic materials	environment
delta	water	positive effects
negative effects	farming	construction

4. Look back at the topographical maps on the student sheets from Activity 26, “Boomtown’s Topography.” Choose one major topographical change in Boomtown. Describe the change and the earth process(es) that may have caused the change.

5. At which of the three building sites—Delta Marsh, Green Hill, and Seaside Cliff—would you expect:
 - a. erosion to have the most effect on the land?
 - b. deposition to have the most effect on the land?

EXTENSION



Earth processes such as weathering, erosion, and deposition help make the landforms that are all around you. Some landforms are formed quickly, while others take millions of years. Visit the *Issues and Earth Science* page of the SEPUP website to find more information about specific landforms found in the United States.